

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 1 is objected to because of the following informalities: in line 7, Applicants may have intended to recite “second functionality elements”. Appropriate correction is required.

Applicants are further respectfully requested to ascertain that the specification is free of typographical and grammatical errors.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 12-24 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a process, which is a heterogeneous reactive rectification for the preparation of tertiary alcohols from the reaction of tertiary olefins having the same number of carbon atoms being reacted with water in an acidic ion exchanger containing said structured multi-purpose packings, it does not reasonably provide enablement for the claimed myriad of process combinations of a physical material process with a chemical or biological process or a process combinations of a physical material process with another, but different from first, physical process, as suggested by the breadth of the instant claims. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make/use the invention commensurate in scope with these claims. The factors to be considered [in making an enablement rejection] have been summarized as a) the nature of the invention, b) the breadth of the claims, c) the state of the prior art, d) the relative skill of those in

Art Unit: 1621

the art, e) the predictability or unpredictability of the art, f) the amount of direction or guidance presented, g) the presence or absence of working examples, and h) the quantity of experimentation necessary.

**a) *the nature of the invention:*** the instant claims are drawn to a process for the combined performance of a physical material process with a chemical or biological process or a process for the combined performance of a physical material process with another, but different from first, physical process, where said physical process is heterogeneous reactive rectification for the preparation of tertiary alcohols and chemical process is the reaction of corresponding tertiary olefins having the same number of carbon atoms being reacted with water in an acidic ion exchanger, containing structured multi-purpose packings.

**b) *the breadth of the claims:*** Independent claim 12 and dependent claims 13-14 are extremely broad in that they recite a broad array of combined processes that are contemplated to be useful together and therefore may be used to produce certain compounds. The claims are interpreted to embrace any physical separation process that includes distillation, rectification, absorption, adsorption or extraction process; and any chemical process that includes alkylation, isomerization, esterification, etherification, hydration, dimerization, oligomerization or polymerization process. The number of processes is large, the combinations therewith and equally the number of compounds formed therefrom. The claims do not recite specific processes for specific compounds; the functionality of the processes described in the instant claims can be applied to a great many processes that are known to be useful. The claims, as recited, therefore, are all encompassing.

Art Unit: 1621

***c&e) state and predictability of the art.*** The claimed processes are not novel. Illustratively, Smith (EP466954, EP'654) teaches a process for the combined physical process of distillation/fractionation of mixed butene streams and the chemical process of reacting isobutene with methanol or the chemical process of dimerising the isobutenes and separating the diisobutene from the n-butenes, using a column with catalyst, comprising catalyst particles contained in a series of closed cloth pockets formed in a single cloth belt reinforced with wire mesh, where said belt is coiled into a spiral so that the wire mesh is disposed between the coils. Herein the catalyst system serves both as catalyst and packing material for distillation (see abstract, page 2).

***d) the relative skill of those in the art:*** the skill is high.

***e&f) amount of guidance present and working examples.*** The instant disclosure provides guidance for the process of making heterogeneous reactive rectification for the preparation of tertiary alcohols from the reaction of tertiary olefins having the same number of carbon atoms being reacted with water in an acidic ion exchanger containing said structured multi-purpose packings.

***g) quantity of experimentation needed.*** The quantity of experimentation required of a person having ordinary skill in the art could potentially be infinite without further guidance. The myriad of combination of processes as recited by the claims is numerous, and equally the compounds therewith. Without further guidance, a person of ordinary skill may have to experiment with different combinations of processes to determine the combinations of processes by which different compounds can be made by way of the functionality of the processes described in the

Art Unit: 1621

instant claim(s). All these elements taken into consideration make the experimentation unduly burdensome.

MPEP 2164.01(a) states, "A conclusion of lack of enablement means that, based on the evidence regarding each of the above factors, the specification, at the time the application was filed, would not have taught one skilled in the art how to make and/use the full scope of the claimed invention without undue experimentation. In re Wright 999 F.2d 1557,1562, 27 USPQ2d 1510, 1513 (Fed.Cir.1993)." That conclusion is clearly justified here. Thus, undue experimentation will be required to practice Applicants' invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 12-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: the method steps that make the tertiary alcohols from the tertiary olefins.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned

Art Unit: 1621

with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 12-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4 and 14 of U.S. Patent No. 6951967, US'967. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims encompass the invention of US'967.

5. Applicants' claims are drawn to a process for the combined performance of a physical material process with a chemical or biological process or a process for the combined performance of a physical material process with another, but different from first, physical process, where said physical process is heterogeneous reactive rectification for the preparation of tertiary alcohols and chemical process is the reaction of corresponding tertiary olefins having the same number of carbon atoms being reacted with water in an acidic ion exchanger, containing structured multi-purpose packings.

6. US'967 teaches a process for the preparation of tertiary alcohols by reacting the corresponding tertiary olefins having the same number of carbon atoms with water in a heterogeneous reactive rectification in the presence of an acidic cation exchanger, characterized in that said process is performed using structured catalytic multi-purpose packings which have sections serving for material separation and sections serving as second functionality elements, wherein said sections serving as second functionality elements have a compartmental structure in which acidic cation exchangers are contained (see abstract, col.3 summary, claim 1-4 and 14).

Art Unit: 1621

7. Applicants' claims differ from US'967 in that the instant claims recite the genus which embraces the species of US'967, where the instant claims embrace a physical separation process that includes distillation, rectification, absorption, adsorption or extraction process; and a chemical process that includes alkylation, isomerization, esterification, etherification, hydration, dimerization, oligomerization or polymerization process; containing structured multi-purpose packings, with functionality as recited therein.

8. The difference is not patentable because one of ordinary skill in the art at the time of Applicants' invention would have found it obvious to use the reactive rectification for the preparation of tertiary alcohols from tertiary olefins using the catalyst system containing structured multi-purpose packings, with functionality as recited therein to be the same scope as the method of US'967.

9. An artisan would have been motivated to employ the method of US'967 to benefit from the high yield and purities achieved from the use of the structured catalytic multi-purpose packings, which enable a clearly improved material exchange between gas/liquid in the sections serving for material separation and ensure a defined high distillation performance (col.3. ll30-35); and the artisan would reach a reasonable expectation of making tertiary alcohols.

***Claim Rejections - 35 USC § 102(e)/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Art Unit: 1621

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

10. Claims 12-24 are rejected under 35 U.S.C. 102(e) as being anticipated by, or in the alternative, rendered obvious by Gohrt et al. (US2003/0120123 PD 6/6/03 (DE10/12/00), which is now issued patent US6951967, US'967).

The applied reference has a common assigned with the instant application. Based upon the earlier effective U.S. filing date of the reference (i.e. 2/13/2003), it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

11. Applicants' claims are drawn to a process for the combined performance of a physical material process with a chemical or biological process or a process for the combined performance of a physical material process with another, but different from first, physical process, where said physical process is heterogeneous reactive rectification for the preparation of tertiary alcohols and chemical process is the reaction of corresponding tertiary olefins having the same number of carbon atoms being reacted with water in an acidic ion exchanger, containing structured multi-purpose packings.

12. Claim rejections over US'967 as set forth above are included herein, in their entirety.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

Art Unit: 1621

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 12-21 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (EP466954, EP'954) or Gorak et al. (DE19701045, DE'045) in view of Smith et al. (US4982022, US'022).

14. Applicants' claims are drawn to a process for the combined performance of a physical material process with a chemical or biological process or a process for the combined performance of a physical material process with another, but different from first, physical process, where said physical process is heterogeneous reactive rectification for the preparation of tertiary alcohols and chemical process is the reaction of corresponding tertiary olefins having the same number of carbon atoms being reacted with water in an acidic ion exchanger, containing structured multi-purpose packings.

15. EP'974 teaches a process for the preparation of tertiary alcohols by reacting the corresponding tertiary olefins having the same number of carbon atoms with water in a heterogeneous reactive rectification in the presence of an acidic cation exchanger, characterized



Art Unit: 1621

in that said process is performed using structured catalytic multi-purpose packings which have sections serving for material separation and sections serving as second functionality elements, wherein said sections serving as second functionality elements have a compartmental structure in which acidic cation exchangers are contained (see abstract, col.3 summary, claim 1-4 and 14). EP'974 teaches a method for the continuous contact of an olefin with an acidic catalyst in a catalyst packed distillation column, which can be appreciated to contain a vapor phase and some liquid phase as in any distillation (page 4 ll42-45). EP'947 teaches dimerization of isobutene concurrent with the fractionation of the resultant n-butene dimer mixture (page 4 ll45-49). EP'947 describes the system to be a heterogeneous reaction system, since the catalyst remains as a distinct entity (page6 ll13-15). EP'947 teaches the catalyst to be an acid cation exchange resin.

16. Alternatively, DE'045 teaches in the English abstract, "multi-purpose column packing consisting of a material separation section (1) and a secondary function section (2). Section (2) contains a number of chambers (3), filled with physically active, chemical or biological, material, according to the requirements of the process." See Figures 1-5 and machine-translated English version of the claims.

17. Applicants' claims differ from EP'947 or DE'045 in that the instant claims recite the process to be a reactive rectification of tertiary alcohols from the corresponding tertiary olefins having the same number of carbon atoms reacted with water in an acidic ion exchanger.

18. The difference is not patentable because reactive rectification of the preparation of tertiary alcohols has been taught in prior art. Illustratively, US'022 teaches a "process for the production of tert alcohols, comprising a) feeding water to a distillation column reactor containing a bed of an acid ion exchange resin, at a point above the height of the bed; b)

Art Unit: 1621

concurrently feeding an isoolefin-containing hydrocarbon stream to the column at a point below the bed; c) i) contacting the water and hydrocarbon stream with the catalyst to form a mixture containing tert alcohol unreacted water and isoolefin; 2) separating the alcohol from the unreacted water and isoolefin by distillation; d) withdrawing alcohol from the column at a point below the bed; e) withdrawing unreacted hydrocarbon from a point above the bed; and f) measuring the amt of water in the alcohol fraction in the lower part of the column and adjusting the water feed rate to maintain the amt above zero but below the azeotropic concentration at the temp and pressure within the column. The process is also useful for production of t-butyl alcohol (TBA) and tert amyl alcohol (TAA) (claimed). Low concentrations of tert-olefins (5mole%) can be substantially removed from hydrocarbon streams providing a means of concurrently separating normal and isoolefins (claimed) while producing an alcohol. Bottoms products containing (98wt%) TBA are obtained. Greater than normal equilibrium product amounts can be formed as the reverse reaction is inhibited by removal of the product from the catalyst as soon as it is formed" (see Abstract and col1, Summary of Invention).

19. An artisan would be motivated to use the production method for the preparation of t-butyl alcohols from t-olefins as taught by US'022 to take advantage of the concurrent reaction of olefin and water to form alcohol in a the acid ion exchanger; while the alcohol product is separated from the reactants by fractional distillation. An artisan would reach a reasonable expectation in making tert-butyl alcohol by the adaptation of methods that have been shown to be efficacious in his art.

20. Claims 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (EP466954, EP'954) or Gorak et al. (DE19701045, DE'045) in view of Smith et al.

Art Unit: 1621

(US4982022, US`022), as applied to claims 12-21 and 23-24 above, further in view of Crossland et al. (US 5431890, US`890)

21. Applicants' claims are drawn to a process for the combined performance of a physical material process with a chemical or biological process or a process for the combined performance of a physical material process with another, but different from first, physical process, where said physical process is heterogeneous reactive rectification for the preparation of tertiary alcohols and chemical process is the reaction of corresponding tertiary olefins having the same number of carbon atoms being reacted with water in an acidic ion exchanger, containing structured multi-purpose packings

22. Claims rejected over EP`954 or DE`045 in views of US`022, as set forth above, are included herein, in their entirety.

23. The cited prior art references are silent in reciting the nature of the polymeric material *inter alia* nylon, PE, PP.

24. The difference is not patentable, however, one of ordinary skill in the art at the time of Applicants' invention would have it obvious to adapt materials that have been efficacious in his art. Illustratively, US`890 teaches materials used in a device in carrying out catalyzed distillations, which include, *inter alia*, open mesh knitted polymeric filaments of nylon, Teflon and the like (col 1148-50), where the catalyst may include *inter alia*, acid cation exchange resins (col 4 table 11 36-45).

25. An artisan would be motivated to use techniques proven to work in his art to benefit from efficient, and cost-savings combined performance of both a physical and chemical process; and expect a reasonable expectation of making tertiary alcohols.

Art Unit: 1621

26. No claims are allowed.

***Conclusion***

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Gelbein et al. US 5073236; Crossland et al. US 5431890; Hearn et al. US 5523062.

***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Louisa Lao whose telephone number is (571)272-9930. The examiner can normally be reached from 8:00am to 8:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on 571-272-0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Louisa Lao

Examiner

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/Karl J. Puttlitz/

Primary Examiner, Art Unit 1621